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(Original Signature of Member)

109TH CONGRESS
2D SESSION

H. R. _____

To provide for Federal energy research, development, demonstration, and
commercial application activities, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mrs. BIGGERT (for herself, Mr. BOEHLERT, Mr. HALL, Mr. SMITH of Texas,
Mr. CALVERT, Mr. EHLERS, Mr. INGLIS of South Carolina, and Mr.
WAMP) introduced the following bill; which was referred to the Committee
on _____

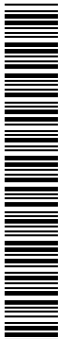
A BILL

To provide for Federal energy research, development, dem-
onstration, and commercial application activities, and for
other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Energy Research, De-
5 velopment, Demonstration, and Commercial Application
6 Act of 2006”.



1 **SEC. 2. DEFINITIONS.**

2 For the purposes of this Act—

3 (1) the term “biomass” has the meaning given
4 that term in section 932(a)(1) of the Energy Policy
5 Act of 2005 (42 U.S.C. 16232(a)(1));

6 (2) the term “cellulosic feedstock” has the
7 meaning given the term “lignocellulosic feedstock”
8 in section 932(a)(2) of the Energy Policy Act of
9 2005 (42 U.S.C. 16232(a)(2));

10 (3) the term “engineering-scale” means the
11 minimum size required to predict with confidence all
12 physical processes controlling the performance of a
13 full-scale industrial facility;

14 (4) the term “National Laboratory” has the
15 meaning given the term “nonmilitary energy labora-
16 tory” in section 903(3) of the Energy Policy Act of
17 2005 (42 U.S.C. 16182(3)); and

18 (5) the term “Secretary” means the Secretary of
19 Energy.

20 **SEC. 3. FUTUREGEN.**

21 (a) IN GENERAL.—The Secretary shall carry out a
22 project to demonstrate the feasibility of the commercial
23 application of advanced clean coal energy technology, in-
24 cluding carbon capture and geological sequestration, for
25 electricity generation.



1 (b) INDUSTRY INVOLVEMENT.—The Secretary may
2 conduct the project through a financial assistance coopera-
3 tive agreement with a consortium of coal-fired power pro-
4 ducers, coal companies, and other electric utility industry
5 and mining industry participants

6 (c) REQUIREMENTS.—The Secretary shall design the
7 project to ensure that—

8 (1) the project is operating by 2012;

9 (2) the project shall be able—

10 (A) to achieve at least a 99 percent reduc-
11 tion in sulfur dioxide emissions or, when burn-
12 ing coal containing 3 pounds or less of sulfur
13 per million British thermal units, the project
14 shall be able to emit no more than 0.03 pounds
15 of sulfur dioxide emissions per million British
16 thermal units of thermal energy produced by
17 the project;

18 (B) to emit no more than 0.05 pounds of
19 nitrogen oxide emissions per million British
20 thermal units of thermal energy produced by
21 the project;

22 (C) to achieve at least a 90 percent reduc-
23 tion in mercury emissions;

24 (D) to emit no more than 0.005 of total
25 particulate emissions in the flue gas per million



1 British thermal units of thermal energy pro-
2 duced by the project; and

3 (E) to achieve at least a 90 percent reduc-
4 tion in carbon dioxide emissions; and

5 (3) the project demonstrates the feasibility of
6 electricity generation from coal using advanced clean
7 coal technology with carbon capture and geological
8 sequestration at a cost not greater than 10 percent
9 higher than the average of all commercial integrated
10 coal gasification combined cycle electric generating
11 plants operating in the United States as of the date
12 of enactment of this Act.

13 (d) **COMMERCIALLY AVAILABLE ADVANCED CLEAN**
14 **COAL TECHNOLOGY.**—To reduce technical risk and focus
15 development efforts on system integration, the Secretary
16 shall, to the extent practicable, ensure that the project uti-
17 lizes available advanced clean coal technology, such as coal
18 gasification technology, for those components of the
19 project where such technology would be appropriate.

20 (e) **AUTHORIZATION OF APPROPRIATIONS.**—There
21 are authorized to be appropriated to the Secretary to carry
22 out this section—

- 23 (1) \$54,000,000 for fiscal year 2007;
24 (2) \$112,000,000 for fiscal year 2008;
25 (3) \$130,000,000 for fiscal year 2009;



- 1 (4) \$95,000,000 for fiscal year 2010;
2 (5) \$75,000,000 for fiscal year 2011; and
3 (6) \$71,000,000 for fiscal year 2012.

4 **SEC. 4. ADVANCED FUEL CYCLE TECHNOLOGIES FOR NU-**
5 **CLEAR POWER.**

6 (a) IN GENERAL.—The Secretary shall carry out a
7 program of research, development, demonstration, and
8 commercial application for advanced nuclear fuel cycle
9 technologies for generating electricity and industrial proc-
10 ess heat from nuclear power, including technologies for
11 spent fuel recycling, waste minimization, and reduction of
12 radioactivity of final waste products.

13 (b) OBJECTIVES.—The Secretary shall design the
14 program under this section to develop technologies that
15 would—

16 (1) minimize the volume and heat load of high-
17 level nuclear waste destined for storage in a geologi-
18 cal repository to the extent that a single repository
19 would be sufficient for storing all nuclear waste gen-
20 erated by United States commercial nuclear power
21 plants during this century;

22 (2) increase the proliferation resistance of com-
23 mercial nuclear power reactors and their associated
24 fuel systems and infrastructure; and



1 (3) increase the amount of useful energy that
2 can be extracted from nuclear fuel.

3 (c) SYSTEMS ANALYSIS.—

4 (1) IN GENERAL.—The Secretary shall develop
5 a comprehensive modeling and simulation capability
6 to enable a thorough analysis of possible advanced
7 nuclear fuel cycle systems. The modeling and sim-
8 ulation capability shall be capable of examining—

9 (A) all of the components of each advanced
10 nuclear fuel cycle system analyzed, including—

11 (i) spent fuel separations technologies;

12 (ii) advanced burner reactor tech-
13 nologies;

14 (iii) fuel fabrication technologies;

15 (iv) advanced thermal reactor tech-
16 nologies, including advanced thermal reac-
17 tor designs that would be capable of reduc-
18 ing the toxicity or radioactivity of spent
19 nuclear fuel components; and

20 (v) waste disposal technologies;

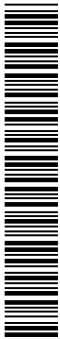
21 (B) the manner in which possible tech-
22 nology and engineering choices for individual
23 components might affect the overall system,
24 and how various system components would
25 interact with one another; and



1 (C) quantitative mass flows of nuclear fuel
2 and spent nuclear fuel, including projected in-
3 ventories and transportation requirements for
4 nuclear fuel and spent nuclear fuel, for any ex-
5 amined system.

6 (2) ADVANCED NUCLEAR FUEL CYCLE SYSTEM
7 PLAN.—

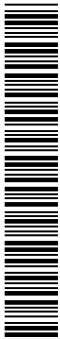
8 (A) ANALYSIS.—The Secretary shall con-
9 duct a thorough analysis of more than one pos-
10 sible configuration of an advanced nuclear fuel
11 cycle system using the analytical capability de-
12 veloped under paragraph (1). Each possible ad-
13 vanced nuclear fuel cycle system configuration
14 examined shall include both advanced burner
15 reactors and advanced thermal reactors, and
16 the analysis shall consider the degree to which
17 each type of reactor could be utilized to reduce
18 the toxicity or radioactivity of spent nuclear
19 fuel components. The analysis of each possible
20 configuration of an advanced nuclear fuel cycle
21 system examined shall examine the compat-
22 ibility of fuel cycle system components, includ-
23 ing each of the system component technologies
24 described in paragraph (1)(A), and the degree



1 to which the examined system would meet the
2 objectives described in subsection (b).

3 (B) PLAN.—Using the results of the anal-
4 yses developed under subparagraph (A), and
5 not later than June 30, 2007, the Secretary
6 shall develop a detailed plan for research, devel-
7 opment, demonstration, and commercial appli-
8 cation on advanced nuclear fuel cycle system
9 technologies, including proposed technology op-
10 tions for each of the system component tech-
11 nologies described in paragraph (1)(A) and any
12 proposed engineering-scale demonstrations of
13 such system component technologies. The plan
14 shall include an estimate of the design, engi-
15 neering, construction and lifetime operating
16 costs of any proposed engineering-scale dem-
17 onstration. In developing the plan, the Sec-
18 retary shall consider the integration into an ad-
19 vanced nuclear fuel cycle system of advanced
20 thermal reactors capable of reducing the tox-
21 icity or radioactivity of spent nuclear fuel com-
22 ponents.

23 (C) CONSULTATION.—In developing the
24 plan under subparagraph (B), the Secretary
25 shall consult with—



1 (i) technical experts from United
2 States and foreign companies that design
3 or engineer nuclear power plants or nu-
4 clear fuel reprocessing facilities;

5 (ii) technical experts from United
6 States electric utilities that operate nuclear
7 power plants;

8 (iii) economists with expertise in nu-
9 clear power and electricity markets;

10 (iv) the Nuclear Energy Research Ad-
11 visory Committee;

12 (v) the Chairman of the Nuclear Reg-
13 ulatory Commission; and

14 (vi) the Administrator of the Environ-
15 mental Protection Agency.

16 (3) NATIONAL ACADEMY OF SCIENCES RE-
17 VIEW.—The Secretary shall enter into an arrange-
18 ment with the National Academy of Sciences to con-
19 duct a review of the plan developed under paragraph
20 (2)(B), including by reviewing the validity of the un-
21 derlying analyses required in paragraph (2)(A).

22 (d) REPORT.—Not later than June 30, 2008, the
23 Secretary shall transmit to Congress a report that includes
24 the research, development, demonstration, and commercial
25 application plan developed under subsection (c)(2)(B), the



1 report from the National Academy of Sciences on the re-
2 view conducted under subsection (c)(3), a revised research,
3 development, demonstration, and commercial application
4 plan that takes into account the findings, conclusions, and
5 recommendations of the report from the National Acad-
6 emy of Sciences, and an explanation of any instances
7 where the Secretary does not concur with the findings,
8 conclusions, and recommendations of the report from the
9 National Academy of Sciences.

10 (e) PROHIBITION.—The Secretary shall not initiate
11 detailed design or construction of any demonstration facil-
12 ity that is capable of processing 750 kilograms or more
13 per year of nuclear fuel or spent nuclear fuel and that
14 is designed to demonstrate the advanced nuclear fuel sys-
15 tem component technologies described in subsection
16 (c)(1)(A)(ii) and (iii) until 90 days after the report under
17 subsection (d) has been transmitted to Congress.

18 (f) AUTHORIZATION OF APPROPRIATIONS.—

19 (1) ALLOCATIONS.—From amounts authorized
20 to be appropriated under section 951(d)(1) of the
21 Energy Policy Act of 2005 (42 U.S.C. 16271(d)(1)),
22 there are authorized to be appropriated to the Sec-
23 retary to carry out this section such sums as may
24 be necessary for each of fiscal years 2007 through
25 2009.



1 (2) ADDITIONAL AMOUNTS.—There are author-
2 ized to be appropriated to the Secretary to carry out
3 this section such sums as may be necessary for each
4 of fiscal years 2010 through 2012.

5 **SEC. 5. ADVANCED BATTERY TECHNOLOGIES.**

6 (a) IN GENERAL.—The Secretary shall carry out a
7 program of research, development, demonstration, and
8 commercial application for advanced battery technologies
9 for use in motor vehicles, particularly for plug-in hybrid
10 electric vehicles.

11 (b) OBJECTIVE.—The Secretary shall design the pro-
12 gram under this section to develop technologies that would
13 enable a light-duty, plug-in hybrid electric vehicle to travel
14 up to 40 miles on battery power alone.

15 (c) AUTHORIZATION OF APPROPRIATIONS.—There
16 are authorized to be appropriated to the Secretary to carry
17 out this section—

- 18 (1) \$31,000,000 for fiscal year 2007;
19 (2) \$34,100,000 for fiscal year 2008;
20 (3) \$37,500,000 for fiscal year 2009; and
21 (4) \$41,250,000 for fiscal year 2010.

22 (d) DEFINITION.—For purposes of this section, the
23 term “plug-in hybrid electric vehicle” has the meaning
24 given the term in section 10.



1 **SEC. 6. ADVANCED BIOFUEL TECHNOLOGIES.**

2 (a) IN GENERAL.—The Secretary shall carry out a
3 program of research, development, demonstration, and
4 commercial application for production of liquid fuels from
5 biomass.

6 (b) OBJECTIVES.—The Secretary shall design the
7 program under this section to—

8 (1) develop technologies that would make eth-
9 anol produced from cellulosic feedstocks cost com-
10 petitive with ethanol produced from corn by 2012;

11 (2) conduct research and development on how
12 to apply advanced genetic engineering and bio-
13 engineering techniques to increase the efficiency and
14 lower the cost of industrial-scale production of liquid
15 fuels from cellulosic feedstocks; and

16 (3) conduct research and development on the
17 production of hydrocarbons other than ethanol from
18 biomass.

19 (c) AUTHORIZATION OF APPROPRIATIONS.—From
20 amounts authorized to be appropriated under section
21 931(c) of the Energy Policy Act of 2005 (42 U.S.C.
22 16231(c)), there are authorized to be appropriated to the
23 Secretary to carry out this section—

24 (1) \$150,000,000 for fiscal year 2007;

25 (2) \$160,000,000 for fiscal year 2008; and

26 (3) \$175,000,000 for fiscal year 2009.



1 **SEC. 7. ADVANCED HYDROGEN STORAGE TECHNOLOGIES.**

2 (a) IN GENERAL.—The Secretary shall carry out a
3 program of research, development, demonstration, and
4 commercial application for technologies to enable practical
5 onboard storage of hydrogen for use as a fuel for light-
6 duty motor vehicles.

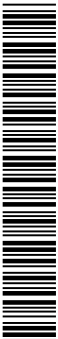
7 (b) OBJECTIVE.—The Secretary shall design the pro-
8 gram under this section to develop practical hydrogen
9 storage technologies that would enable a hydrogen-fueled
10 light-duty motor vehicle to travel 300 miles before refuel-
11 ing.

12 (c) AUTHORIZATION OF APPROPRIATIONS.—In addi-
13 tion to amounts otherwise authorized to be appropriated,
14 there are authorized to be appropriated to the Secretary
15 to carry out this section—

- 16 (1) \$46,000,000 for fiscal year 2007;
17 (2) \$50,000,000 for fiscal year 2008;
18 (3) \$55,000,000 for fiscal year 2009; and
19 (4) \$60,000,000 for fiscal year 2010.

20 **SEC. 8. ADVANCED SOLAR PHOTOVOLTAIC TECHNOLOGIES.**

21 (a) IN GENERAL.—The Secretary shall carry out a
22 program of research, development, demonstration, and
23 commercial application for advanced solar photovoltaic
24 technologies.



1 (b) OBJECTIVES.—The Secretary shall design the
2 program under this section to develop technologies that
3 would—

4 (1) make electricity generated by solar photo-
5 voltaic power cost-competitive by 2015; and

6 (2) enable the widespread use of solar photo-
7 voltaic power.

8 (c) AUTHORIZATION OF APPROPRIATIONS.—There
9 are authorized to be appropriated to the Secretary to carry
10 out this section—

11 (1) \$148,000,000 for fiscal year 2007;

12 (2) \$155,000,000 for fiscal year 2008;

13 (3) \$165,000,000 for fiscal year 2009; and

14 (4) \$180,000,000 for fiscal year 2010.

15 **SEC. 9. ADVANCED WIND ENERGY TECHNOLOGIES.**

16 (a) IN GENERAL.—The Secretary shall carry out a
17 program of research, development, demonstration, and
18 commercial application for advanced wind energy tech-
19 nologies.

20 (b) OBJECTIVES.—The Secretary shall design the
21 program under this section to—

22 (1) improve the efficiency and lower the cost of
23 wind turbines;

24 (2) minimize adverse environmental impacts;
25 and



1 (3) develop new small-scale wind energy tech-
2 nologies for use in low wind speed environments.

3 (c) AUTHORIZATION OF APPROPRIATIONS.—There
4 are authorized to be appropriated to the Secretary to carry
5 out this section—

6 (1) \$44,000,000 for fiscal year 2007;

7 (2) \$48,400,000 for fiscal year 2008;

8 (3) \$53,240,000 for fiscal year 2009; and

9 (4) \$58,564,000 for fiscal year 2010.

10 **SEC. 10. PLUG-IN HYBRID ELECTRIC VEHICLE TECH-**
11 **NOLOGY PROGRAM.**

12 (a) SHORT TITLE.—This section may be cited as the
13 “Plug-In Hybrid Electric Vehicle Act of 2006”.

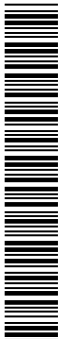
14 (b) DEFINITIONS.—In this section:

15 (1) BATTERY.—The term “battery” means a
16 device or system for the electrochemical storage of
17 energy.

18 (2) E85.—The term “E85” means a fuel blend
19 containing 85 percent ethanol and 15 percent gaso-
20 line by volume.

21 (3) ELECTRIC DRIVE TRANSPORTATION TECH-
22 NOLOGY.—The term “electric drive transportation
23 technology” means—

24 (A) vehicles that use an electric motor for
25 all or part of their motive power and that may



1 or may not use offboard electricity, including
2 battery electric vehicles, fuel cell vehicles, hy-
3 brid electric vehicles, plug-in hybrid electric ve-
4 hicles, flexible fuel plug-in hybrid electric vehi-
5 cles, and electric rail; and

6 (B) related equipment, including electric
7 equipment necessary to recharge a plug-in hy-
8 brid electric vehicle.

9 (4) FLEXIBLE FUEL PLUG-IN HYBRID ELEC-
10 TRIC VEHICLE.—The term “flexible fuel plug-in hy-
11 brid electric vehicle” means a plug-in hybrid electric
12 vehicle—

13 (A) warranted by its manufacturer as ca-
14 pable of operating on any combination of gaso-
15 line or E85 for its onboard internal combustion
16 or heat engine; or

17 (B) that uses a fuel cell for battery charg-
18 ing when disconnected from offboard power
19 sources.

20 (5) FUEL CELL VEHICLE.—The term “fuel cell
21 vehicle” means an onroad vehicle that uses a fuel
22 cell (as defined in section 803 of the Energy Policy
23 Act of 2005 (42 U.S.C. 16152)).

24 (6) HYBRID ELECTRIC VEHICLE.—The term
25 “hybrid electric vehicle” means a vehicle that—



1 (A) can be propelled using liquid combus-
2 tible fuel and electric power provided by an on-
3 board battery; and

4 (B) utilizes regenerative power capture
5 technology to recover energy expended in brak-
6 ing the vehicle for use in recharging the bat-
7 tery.

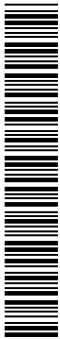
8 (7) PLUG-IN HYBRID ELECTRIC VEHICLE.—The
9 term “plug-in hybrid electric vehicle” means a hy-
10 brid electric onroad light-duty vehicle that can be
11 propelled solely on electric power for a minimum of
12 20 miles under city driving conditions, and that is
13 capable of recharging its battery from an offboard
14 electricity source.

15 (c) PROGRAM.—The Secretary shall conduct a pro-
16 gram of research, development, demonstration, and com-
17 mercial application on technologies needed for the develop-
18 ment of plug-in hybrid electric vehicles, including—

19 (1) high capacity, high efficiency batteries, to—

20 (A) improve battery life, energy storage ca-
21 pacity, and power delivery capacity, and lower
22 cost; and

23 (B) minimize waste and hazardous mate-
24 rial production in the entire value chain, includ-



1 ing after the end of the useful life of the bat-
2 teries;

3 (2) high efficiency onboard and offboard charg-
4 ing components;

5 (3) high power drive train systems for pas-
6 senger and commercial vehicles and for supporting
7 equipment;

8 (4) onboard energy management systems, power
9 trains, and systems integration for plug-in hybrid
10 electric vehicles, flexible fuel plug-in hybrid electric
11 vehicles, and hybrid electric vehicles, including effi-
12 cient cooling systems and systems that minimize the
13 emissions profile of such vehicles; and

14 (5) lightweight materials, including research,
15 development, demonstration, and commercial appli-
16 cation to reduce the cost of materials such as steel
17 alloys and carbon fibers.

18 (d) PLUG-IN HYBRID ELECTRIC VEHICLE DEM-
19 ONSTRATION PROGRAM.—

20 (1) ESTABLISHMENT.—The Secretary shall es-
21 tablish a competitive grant pilot demonstration pro-
22 gram to provide not more than 25 grants annually
23 to State governments, local governments, metropoli-
24 tan transportation authorities, or combinations



1 thereof to carry out a project or projects for dem-
2 onstration of plug-in hybrid electric vehicles.

3 (2) APPLICATIONS.—

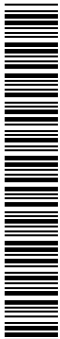
4 (A) REQUIREMENTS.—The Secretary shall
5 issue requirements for applying for grants
6 under the demonstration pilot program. The
7 Secretary shall require that applications, at a
8 minimum, include a description of how data will
9 be—

10 (i) collected on the—

11 (I) performance of the vehicle or
12 vehicles and the components, includ-
13 ing the battery, energy management,
14 and charging systems, under various
15 driving speeds, trip ranges, traffic,
16 and other driving conditions;

17 (II) costs of the vehicle or vehi-
18 cles, including acquisition, operating,
19 and maintenance costs, and how the
20 project or projects will be self-sus-
21 taining after Federal assistance is
22 completed; and

23 (III) emissions of the vehicle or
24 vehicles, including greenhouse gases,
25 and the amount of petroleum dis-



1 placed as a result of the project or
2 projects; and

3 (ii) summarized for dissemination to
4 the Department, other grantees, and the
5 public.

6 (B) PARTNERS.—An applicant under sub-
7 paragraph (A) may carry out a project or
8 projects under the pilot program in partnership
9 with one or more private entities.

10 (3) SELECTION CRITERIA.—

11 (A) PREFERENCE.—When making awards
12 under this subsection, the Secretary shall con-
13 sider each applicant's previous experience in-
14 volving plug-in hybrid electric vehicles and shall
15 give preference to proposals that—

16 (i) provide the greatest demonstration
17 per award dollar, with preference increas-
18 ing as the number of miles that a plug-in
19 hybrid electric vehicle can be propelled
20 solely on electric power under city driving
21 conditions increases; and

22 (ii) maximize the non-Federal share of
23 project funding and demonstrate the great-
24 est likelihood that each project proposed in
25 the application will be maintained or ex-



1 panded after Federal assistance under this
2 subsection is completed.

3 (B) BREADTH OF DEMONSTRATIONS.—In
4 awarding grants under this subsection, the Sec-
5 retary shall ensure the program will dem-
6 onstrate plug-in hybrid electric vehicles under
7 various circumstances, including—

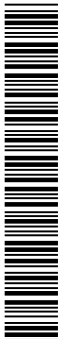
- 8 (i) driving speeds;
9 (ii) trip ranges;
10 (iii) driving conditions;
11 (iv) climate conditions; and
12 (v) topography,

13 to optimize understanding and function of plug-
14 in hybrid electric vehicles.

15 (5) PILOT PROJECT REQUIREMENTS.—

16 (A) SUBSEQUENT FUNDING.—An applicant
17 that has received a grant in one year may apply
18 for additional funds in subsequent years, but
19 the Secretary shall not provide more than
20 \$10,000,000 in Federal assistance under the
21 pilot program to any applicant for the period
22 encompassing fiscal years 2007 through fiscal
23 year 2011.

24 (B) INFORMATION.—The Secretary shall
25 establish mechanisms to ensure that the infor-



1 mation and knowledge gained by participants in
2 the pilot program are shared among the pilot
3 program participants and are available to other
4 interested parties, including other applicants.

5 (6) AWARD AMOUNTS.—The Secretary shall de-
6 termine grant amounts, but the maximum size of
7 grants shall decline as the cost of producing plug-in
8 hybrid electric vehicles declines or the cost of con-
9 verting a hybrid electric vehicle to a plug-in hybrid
10 electric vehicle declines.

11 (e) COST SHARING.—The Secretary shall carry out
12 the program under this section in compliance with section
13 988(a) through (d) and section 989 of the Energy Policy
14 Act of 2005 (42 U.S.C. 16352(a) through (d) and 16353).

15 (f) AUTHORIZATION OF APPROPRIATIONS.—There
16 are authorized to be appropriated to the Secretary—

17 (1) for carrying out subsection (c),
18 \$250,000,000 for each of fiscal years 2007 through
19 2011, of which up to \$50,000,000 may be used for
20 the program described in paragraph (5) of that sub-
21 section; and

22 (2) for carrying out subsection (d),
23 \$50,000,000 for each of fiscal years 2007 through
24 2011.



1 **SEC. 11. PHOTOVOLTAIC DEMONSTRATION PROGRAM.**

2 (a) SHORT TITLE.—This section may be cited as the
3 “Solar Utilization Now Demonstration Act of 2006” or the
4 “SUN Act of 2006”.

5 (b) IN GENERAL.—The Secretary shall establish a
6 program of grants to States to demonstrate advanced pho-
7 tovoltaic technology.

8 (c) REQUIREMENTS.—

9 (1) ABILITY TO MEET REQUIREMENTS.—To re-
10 ceive funding under the program under this section,
11 a State must submit a proposal that demonstrates,
12 to the satisfaction of the Secretary, that the State
13 will meet the requirements of subsection (g).

14 (2) COMPLIANCE WITH REQUIREMENTS.—If a
15 State has received funding under this section for the
16 preceding year, the State must demonstrate, to the
17 satisfaction of the Secretary, that it complied with
18 the requirements of subsection (g) in carrying out
19 the program during that preceding year, and that it
20 will do so in the future, before it can receive further
21 funding under this section.

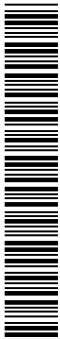
22 (3) FUNDING ALLOCATION.—Except as pro-
23 vided in subsection (d), each State submitting a pro-
24 posal that meets the requirements under subsection
25 (c) shall receive funding under the program based on
26 the proportion of United States population in the



1 State according to the 2000 census. In each fiscal
2 year, the portion of funds attributable under this
3 paragraph to States that have not submitted pro-
4 posals that meet the requirements under subsection
5 (c) in the time and manner specified by the Sec-
6 retary shall be distributed pro rata to the States
7 that have submitted proposals that meet the require-
8 ments under subsection (c) in the specified time and
9 manner.

10 (d) COMPETITION.—If more than \$80,000,000 is
11 available for the program under this section for any fiscal
12 year, the Secretary shall allocate 75 percent of the total
13 amount of funds available according to subsection (c)(3),
14 and shall award the remaining 25 percent on a competitive
15 basis to the States with the proposals the Secretary con-
16 siders most likely to encourage the widespread adoption
17 of photovoltaic technologies. In awarding funds under this
18 subsection, the Secretary may give preference to proposals
19 that would demonstrate the use of newer materials or
20 technologies.

21 (e) PROPOSALS.—Not later than 6 months after the
22 date of enactment of this Act, and in each subsequent fis-
23 cal year for the life of the program, the Secretary shall
24 solicit proposals from the States to participate in the pro-
25 gram under this section.



1 (f) COMPETITIVE CRITERIA.—In awarding funds in
2 a competitive allocation under subsection (d), the Sec-
3 retary shall consider—

4 (1) the likelihood of a proposal to encourage the
5 demonstration of, or lower the costs of, advanced
6 photovoltaic technologies; and

7 (2) the extent to which a proposal is likely to—
8 (A) maximize the amount of photovoltaics
9 demonstrated;

10 (B) maximize the proportion of non-Fed-
11 eral cost share; and

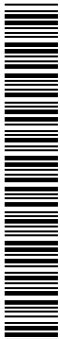
12 (C) limit State administrative costs.

13 (g) STATE PROGRAM.—A program operated by a
14 State with funding under this section shall provide com-
15 petitive awards for the demonstration of advanced photo-
16 voltaic technologies. Each State program shall—

17 (1) require a contribution of at least 60 percent
18 per award from non-Federal sources, which may in-
19 clude any combination of State, local, and private
20 funds, except that at least 10 percent of the funding
21 must be supplied by the State;

22 (2) limit awards for any single project to a
23 maximum of \$1,000,000;

24 (3) prohibit any nongovernmental recipient
25 from receiving more than \$1,000,000 per year;



1 (4) endeavor to fund recipients in the commer-
2 cial, industrial, institutional, governmental, and resi-
3 dential sectors;

4 (5) limit State administrative costs to no more
5 than 10 percent of the grant;

6 (6) report annually to the Secretary on—

7 (A) the amount of funds disbursed;

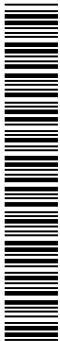
8 (B) the amount of photovoltaics purchased;
9 and

10 (C) the results of the monitoring under
11 paragraph (7);

12 (7) provide for measurement and verification of
13 the output of a representative sample of the
14 photovoltaics systems demonstrated throughout the
15 average working life of the systems, or at least 20
16 years; and

17 (8) require that applicant buildings must have
18 received an independent energy efficiency audit dur-
19 ing the 6-month period preceding the filing of the
20 application.

21 (h) UNEXPENDED FUNDS.—If a State fails to expend
22 any funds received under subsection (c) or (d) within 3
23 years of receipt, such remaining funds shall be returned
24 to the Treasury.



1 (i) REPORTS.—The Secretary shall report to Con-
2 gress 5 years after funds are first distributed to the States
3 under this section—

4 (1) the amount of photovoltaics demonstrated;

5 (2) the number of projects undertaken;

6 (3) the administrative costs of the program;

7 (4) the amount of funds that each State has
8 not received because of a failure to submit a quali-
9 fying proposal, as described in subsection (c)(3);

10 (5) the results of the monitoring under sub-
11 section (g)(7); and

12 (6) the total amount of funds distributed, in-
13 cluding a breakdown by State.

14 (j) AUTHORIZATION OF APPROPRIATIONS.—There
15 are authorized to be appropriated to the Secretary for the
16 purposes of carrying out this section—

17 (1) \$50,000,000 for fiscal year 2007;

18 (2) \$100,000,000 for fiscal year 2008;

19 (3) \$150,000,000 for fiscal year 2009;

20 (4) \$200,000,000 for fiscal year 2010; and

21 (5) \$300,000,000 for fiscal year 2011.

22 **SEC. 12. ENERGY EFFICIENT BUILDING GRANT PROGRAM.**

23 (a) ENERGY EFFICIENT BUILDING PILOT GRANT
24 PROGRAM.—



1 (1) IN GENERAL.—Not later than 6 months
2 after the date of enactment of this Act, the Sec-
3 retary shall establish a pilot program to award
4 grants to businesses and organizations for new con-
5 struction of energy efficient buildings, or major ren-
6 ovations of buildings that will result in energy effi-
7 cient buildings, to demonstrate innovative energy ef-
8 ficiency technologies, especially those sponsored by
9 the Department of Energy.

10 (2) AWARDS.—The Secretary shall award
11 grants under this subsection competitively to those
12 applicants whose proposals—

13 (A) best demonstrate—

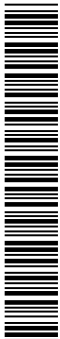
14 (i) likelihood to meet or exceed the
15 standards referred to in subsection (b)(2);

16 (ii) likelihood to maximize cost-effec-
17 tive energy efficiency opportunities; and

18 (iii) advanced energy efficiency tech-
19 nologies; and

20 (B) are least likely to be realized without
21 Federal assistance.

22 (3) AMOUNT OF GRANTS.—Grants under this
23 subsection shall be for up to 50 percent of design
24 and energy modeling costs, not to exceed \$50,000



1 per building. No single grantee may be eligible for
2 more than 3 grants per year under this program.

3 (4) GRANT PAYMENTS.—

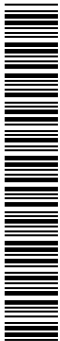
4 (A) INITIAL PAYMENT.—The Secretary
5 shall pay 50 percent of the total amount of the
6 grant to grant recipients upon selection.

7 (B) REMAINDER OF PAYMENT.—The Sec-
8 retary shall pay the remaining 50 percent of the
9 grant only after independent certification that
10 operational buildings are energy efficient build-
11 ings as defined in subsection (b).

12 (C) FAILURE TO COMPLY.—The Secretary
13 shall not provide the remainder of the payment
14 unless the building is certified within 6 months
15 after operation of the completed building to
16 meet the requirements described in subpara-
17 graph (B), or in the case of major renovations
18 the building is certified within 6 months of the
19 completion of the renovations.

20 (5) REPORT TO CONGRESS.—Not later than 3
21 years after awarding the first grant under this sub-
22 section, the Secretary shall transmit to Congress a
23 report containing—

24 (A) the total number and dollar amount of
25 grants awarded under this subsection; and



1 (B) an estimate of aggregate cost and en-
2 ergy savings enabled by the pilot program
3 under this subsection.

4 (6) ADMINISTRATIVE EXPENSES.—Administra-
5 tive expenses for the program under this subsection
6 shall not exceed 10 percent of appropriated funds.

7 (b) DEFINITION OF ENERGY EFFICIENT BUILD-
8 ING.—For purposes of this section the term “energy effi-
9 cient building” means a building that—

10 (1) achieves a reduction in energy consumption
11 of—

12 (A) at least 25 percent for new construc-
13 tion, compared to the energy standards set by
14 the 2004 International Energy Conservation
15 Code (in the case of residential buildings) or
16 ASHRAE Standard 90.1–2004; or

17 (B) at least 20 percent for major renova-
18 tions, compared to energy consumption before
19 renovations are begun; and

20 (2) is constructed or renovated in accordance
21 with the most current, appropriate, and applicable
22 voluntary consensus standards, as determined by the
23 Secretary, such as those listed in the assessment
24 under section 914(b), or revised or developed under
25 section 914(c), of the Energy Policy Act of 2005.



1 (c) AUTHORIZATION OF APPROPRIATIONS.—There
2 are authorized to be appropriated to the Secretary for car-
3 rying out this section \$10,000,000 for each of the fiscal
4 years 2008 through 2012.

5 **SEC. 13. ENERGY EXTENSION.**

6 (a) DEFINITIONS.—For purposes of this section:

7 (1) COOPERATIVE EXTENSION.—The term “Co-
8 operative Extension” means the extension services
9 established at the land-grant colleges and univer-
10 sities under the Smith-Lever Act of May 8, 1914.

11 (2) DEPARTMENT.—The term “Department”
12 means the Department of Energy.

13 (3) ENERGY SUPPLY RESEARCH AND DEVELOP-
14 MENT PROGRAMS.—The term “energy supply re-
15 search and development programs” means the re-
16 search, development, demonstration, and commercial
17 application programs in the Office of Energy Effi-
18 ciency and Renewable Energy, the Office of Elec-
19 tricity Delivery and Energy Reliability, and the Of-
20 fice of Fossil Energy.

21 (4) INSTITUTION OF HIGHER EDUCATION.—The
22 term “institution of higher education” has the
23 meaning given that term in section 101(a) of the
24 Higher Education Act of 1965 (20 U.S.C. 1001(a)).



1 (5) LAND-GRANT COLLEGES AND UNIVER-
2 SITIES.—The term “land-grant colleges and univer-
3 sities” means—

4 (A) 1862 Institutions (as defined in sec-
5 tion 2 of the Agricultural Research, Extension,
6 and Education Reform Act of 1998 (7 U.S.C.
7 7601));

8 (B) 1890 Institutions (as defined in sec-
9 tion 2 of that Act); and

10 (C) 1994 Institutions (as defined in section
11 2 of that Act).

12 (b) IN GENERAL.—

13 (1) GRANTS.—The Secretary, through the en-
14 ergy supply research and development programs of
15 the Department, shall carry out a program to award
16 competitive, merit-reviewed grants to Cooperative
17 Extension services or offices, States, local govern-
18 ments, institutions of higher education, and non-
19 profit institutions with expertise in energy research
20 or extension, or consortia thereof, to conduct activi-
21 ties to transfer knowledge and information about ad-
22 vanced energy technologies that increase efficiency of
23 energy use, especially those developed at the Na-
24 tional Laboratories and by the Department, to indi-
25 viduals, businesses, nonprofit entities, and public en-



1 tities, including local governments and school dis-
2 tricts.

3 (2) REQUIREMENT.—To receive funding under
4 this section, a grant applicant must already operate
5 an outreach program capable of transferring knowl-
6 edge and information about advanced energy tech-
7 nologies that increase efficiency of energy use, or
8 must partner with an entity that has such an out-
9 reach program.

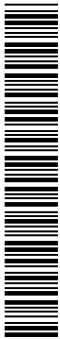
10 (c) USES OF FUNDS.—Funds awarded under this
11 section may be used for the following activities:

12 (1) Developing and distributing informational
13 materials on technologies that could use energy more
14 efficiently.

15 (2) Carrying out small-scale projects to dem-
16 onstrate technologies that could use energy more ef-
17 ficiently.

18 (3) Developing and conducting seminars, work-
19 shops, long-distance learning sessions, and other ac-
20 tivities to aid in the dissemination of knowledge and
21 information on technologies that could use energy
22 more efficiently.

23 (4) Providing or coordinating onsite energy
24 evaluations for a wide range of energy end-users.



1 (5) Examining the energy efficiency needs of
2 energy end-users to develop recommended research
3 projects for the Department.

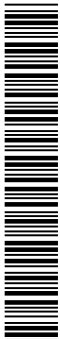
4 (6) Hiring experts in energy efficient tech-
5 nologies to carry out activities described in para-
6 graphs (1) through (5).

7 (7) Carrying out any other activities the Sec-
8 retary believes will accomplish the purposes de-
9 scribed in subsection (b)(1).

10 (d) SELECTION PROCESS APPLICATION.—An appli-
11 cant seeking funding under this section shall submit an
12 application to the Secretary at such time, in such manner,
13 and containing such information as the Secretary may re-
14 quire. The application shall include, at a minimum—

15 (1) a description of the applicant's current out-
16 reach program and of why it would be capable of
17 transferring knowledge and information about ad-
18 vanced energy technologies that increase efficiency of
19 energy use;

20 (2) a description of the activities the applicant
21 would carry out, of the technologies that would be
22 transferred, and of who would be carrying out those
23 activities;



1 (3) a description of how the proposed activities
2 would be appropriate to the specific energy needs of
3 the area to be served;

4 (4) an estimate of the number and types of en-
5 ergy end-users expected to be reached through such
6 activities; and

7 (5) a description of how the applicant will as-
8 sess the success of the program.

9 (e) REVIEW OF APPLICATIONS.—In evaluating the
10 applications submitted under this section, the Secretary
11 shall consider, at a minimum—

12 (1) the ability of the applicant to effectively
13 carry out the proposed program;

14 (2) the appropriateness of the applicant's out-
15 reach program for carrying out the program de-
16 scribed in this section; and

17 (3) the likelihood that proposed activities could
18 be expanded or used as a model for other areas.

19 (f) AWARDS.—

20 (1) DISTRIBUTION.—In making awards under
21 this section, the Secretary shall ensure that, to the
22 extent practicable, the program enables the transfer
23 of knowledge and information about a variety of
24 technologies and enables the transfer of knowledge
25 and information in a variety of geographic areas.



1 (2) FOCUS.—In making awards under this sec-
2 tion, the Secretary shall give priority to applicants
3 that would significantly expand on or fill a gap in
4 existing programs in a geographical region.

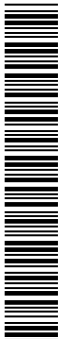
5 (g) COST SHARING.—The Secretary shall require
6 cost-sharing in accordance with the requirements of sec-
7 tion 988 of the Energy Policy Act of 2005 (42 U.S.C.
8 16352) for commercial application activities.

9 (h) DURATION.—

10 (1) INITIAL GRANT PERIOD.—A grant awarded
11 under this section shall be for a period of 5 years.

12 (2) INITIAL EVALUATION.—Each grantee under
13 this section shall be evaluated during its third year
14 of operation under procedures established by the
15 Secretary to determine if the grantee is accom-
16 plishing the purposes of this section described in
17 subsection (b)(1). The Secretary shall terminate any
18 grant that does not receive a positive evaluation. If
19 an evaluation is positive, the Secretary may extend
20 the grant for 3 additional years beyond the original
21 term of the grant.

22 (3) ADDITIONAL EXTENSION.— If a grantee re-
23 ceives an extension under paragraph (2), the grantee
24 shall be evaluated again during the second year of
25 the extension. The Secretary shall terminate any



1 grant that does not receive a positive evaluation. If
2 an evaluation is positive, the Secretary may extend
3 the grant for a final additional period of 3 additional
4 years beyond the original extension.

5 (4) LIMITATION.—No grantee may receive more
6 than 11 years of support under this section without
7 reapplying for support and competing against all
8 other applicants seeking a grant at that time.

9 (i) TECHNICAL ASSISTANCE.—The Secretary and the
10 National Laboratories may provide technical assistance on
11 advanced energy technologies and methods to grantees.

12 (j) AUTHORIZATION OF APPROPRIATIONS.—There
13 are authorized to be appropriated to the Secretary for car-
14 rying out this section—

- 15 (1) \$25,000,000 for fiscal year 2008;
16 (2) \$27,375,000 for fiscal year 2009;
17 (3) \$30,000,000 for fiscal year 2010;
18 (4) \$32,900,000 for fiscal year 2011; and
19 (5) \$36,000,000 for fiscal year 2012.

20 **SEC. 14. GREEN ENERGY EDUCATION.**

21 (a) DEFINITION.—For the purposes of this section:

22 (1) DIRECTOR.—The term “Director” means
23 the Director of the National Science Foundation.

24 (2) HIGH PERFORMANCE BUILDING.—The term
25 “high performance building” has the meaning given



1 that term in section 914(a) of the Energy Policy Act
2 of 2005 (42 U.S.C. 16194(a)).

3 (b) GRADUATE TRAINING IN ENERGY RESEARCH
4 AND DEVELOPMENT.—

5 (1) FUNDING.—In carrying out research, devel-
6 opment, demonstration, and commercial application
7 activities authorized for the Department of Energy,
8 the Secretary may contribute funds to the National
9 Science Foundation for the Integrative Graduate
10 Education and Research Traineeship program to
11 support projects that enable graduate education re-
12 lated to such activities.

13 (2) CONSULTATION.—The Director shall con-
14 sult with the Secretary when preparing solicitations
15 and awarding grants for projects described in para-
16 graph (1).

17 (c) CURRICULUM DEVELOPMENT FOR HIGH PER-
18 FORMANCE BUILDING DESIGN.—

19 (1) FUNDING.—In carrying out advanced en-
20 ergy technology research, development, demonstra-
21 tion, and commercial application activities author-
22 ized for the Department of Energy related to high
23 performance buildings, the Secretary may contribute
24 funds to curriculum development activities at the
25 National Science Foundation for the purpose of im-



1 proving undergraduate or graduate interdisciplinary
2 engineering and architecture education related to the
3 design and construction of high performance build-
4 ings, including development of curricula, of labora-
5 tory activities, of training practicums, or of design
6 projects. A primary goal of curriculum development
7 activities supported under this section shall be to im-
8 prove the ability of engineers, architects, and plan-
9 ners to work together on the incorporation of ad-
10 vanced energy technologies during the design and
11 construction of high performance buildings.

12 (2) CONSULTATION.—The Director shall con-
13 sult with the Secretary when preparing solicitations
14 and awarding grants for projects described in para-
15 graph (1).

16 (3) PRIORITY.—In awarding grants with re-
17 spect to which the Secretary has contributed funds
18 under this subsection, the Director shall give priority
19 to applications from departments, programs, or cen-
20 ters of a school of engineering that are partnered
21 with schools, departments, or programs of design,
22 architecture, and city, regional, or urban planning.

23 **SEC. 15. ARPA-E STUDY.**

24 (a) IN GENERAL.—The Secretary shall enter into an
25 arrangement with the National Academy of Sciences to



1 conduct a detailed study of, and make further rec-
2 ommendations on, the October 2005 National Academy of
3 Sciences recommendation to establish an Advanced Re-
4 search Projects Agency-Energy (in this section referred to
5 as ARPA-E).

6 (b) REPORT.—Not later than 12 months after the
7 date of enactment of this Act, the Secretary shall transmit
8 to Congress the study described in subsection (a) and the
9 Secretary's response to the findings, conclusions, and rec-
10 ommendations of that study.

11 (c) TERMS OF REFERENCE.—The Secretary shall en-
12 sure that the study described in subsection (a) addresses
13 the following questions:

14 (1) What basic research related to new energy
15 technologies is occurring now, what entities are
16 funding it, and what is preventing the results of that
17 research from reaching the market?

18 (2) What economic evidence indicates that the
19 limiting factor in the market penetration of new en-
20 ergy technologies is a lack of basic research on path-
21 breaking new technologies? What barriers do those
22 trying to develop new energy technologies face dur-
23 ing later stages of research and development?

24 (3) To what extent is the Defense Advanced
25 Research Projects Agency an appropriate model for



1 an energy research agency, given that the Federal
2 Government would not be the primary customer for
3 its technology and where cost is an important con-
4 cern?

5 (4) How would research and development spon-
6 sored by ARPA-E differ from research and develop-
7 ment conducted by the National Laboratories or
8 sponsored by the Department of Energy through the
9 Office of Science, the Office of Energy Efficiency
10 and Renewable Energy, the Office of Fossil Energy,
11 the Office of Electricity Delivery and Energy Reli-
12 ability, and the Office of Nuclear Energy?

13 (5) Should industry or National Laboratories be
14 recipients of ARPA-E grants? What institutional or
15 organizational arrangements would be required to
16 ensure that ARPA-E sponsors transformational,
17 rather than incremental, research and development?

